# Army Test and Evaluation Command

# Virtual Proving Ground


# Synthetic Environment Integrated Test Bed (SEIT)

Session V

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US Army Electronic Proving Ground

# OUTLINE

- OVERVIEW
- SCHEDULE
- SCENARIO
- ARCHITECTURE
- TEST CENTER SEIT ACTIVITIES
  - ATC, ATTC, DPG, EPG, RTTC, WSMR, YPG
- BENEFITS
- SUMMARY

# SEIT OVERVIEW

## PURPOSE

Create a realistic representation of the natural and man-made environment to support the testing of Legacy, Interim and Objective Army Forces at differing levels of system maturity

## GOALS

- Leverage the highest quality synthetic environment M&S and T&E capabilities from across DoD, with emphasis on DTC capabilities
- Create a common, integrated, multi-level resolution environment to support life cycle M&S and T&E requirements
- Integrate engineering level simulations representing a variety of T&E technology
- Develop the overall SEIT architecture using manageable SEIT threads

## MISSION

- Identify synthetic environment capabilities required to support Army T&E
- Develop capabilities that provide accurate information for supporting T&E
- Integrate ATEC Synthetic Environment M&S and T&E capabilities to provide "best- value" to the warfighter
- Establish collaboration among Subject Matter Experts (SMEs) and leverage expertise in multiple technology areas

## VISION

A Synthetic Environment that can efficiently adapt to provide a realistic representation of the environment for supporting test and evaluation of Army systems

# SEIT DESCRIPTION

## Synthetic Environments Integrated Test Bed (SEIT)

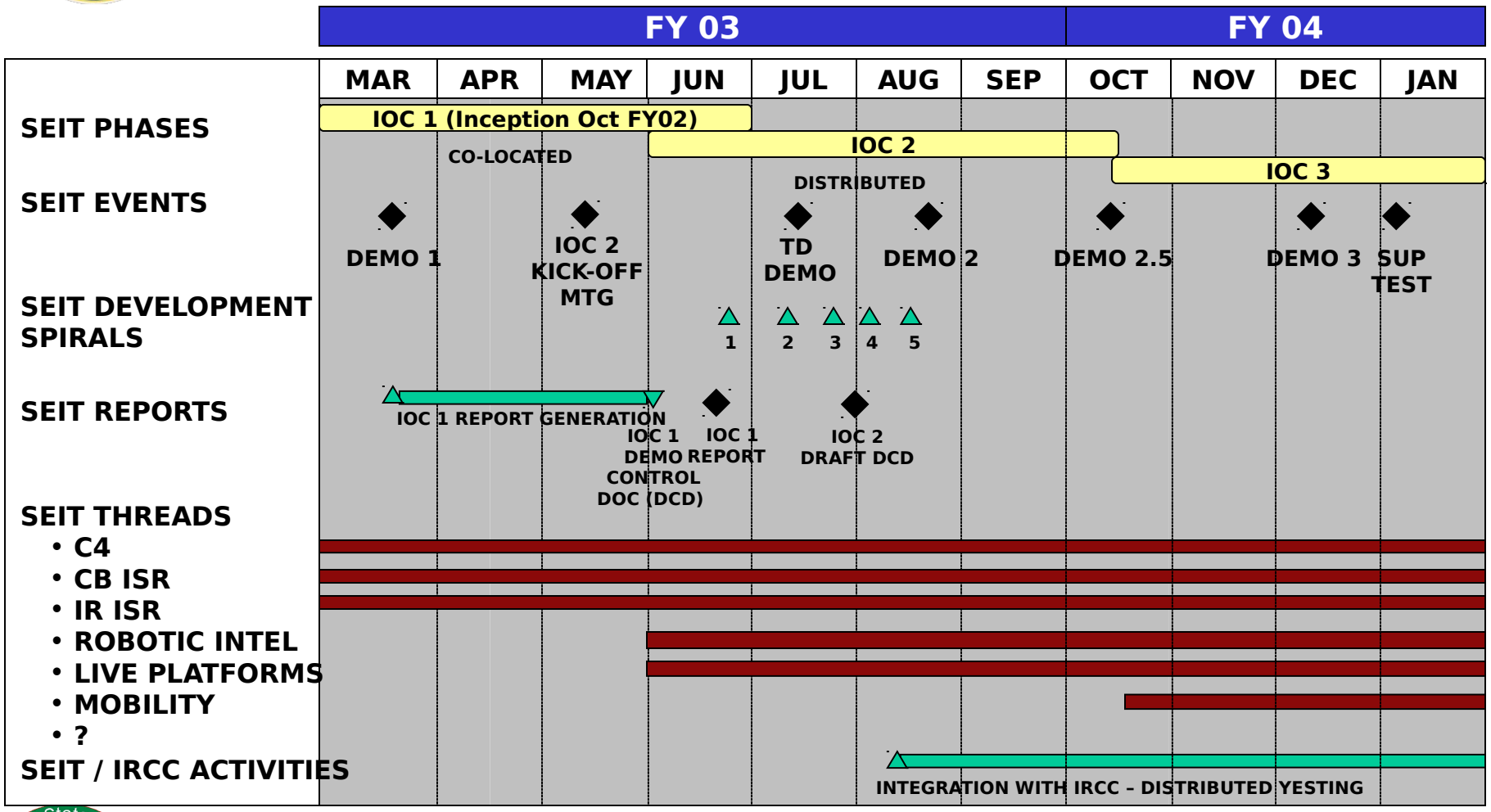
VPG Synthetic Environment Focus Group Effort for developing a *high resolution* representation of the natural and man-made environment leveraging existing M&S & live capabilities in an attempt to provide a *standard and common* application of this environment to support life cycle simulation requirements in DoD acquisition, and distributed Army Testing for the Future Combat System (FCS).

## SEIT Threads

*Complete representation* of an aspect of the *environment* that can be integrated into a variety of simulations to suit multiple purposes in the *RDA Domain*. In FCS test simulations, threads will enable the *end to end assessment* of sensor – C2 – shooter or decision maker chains supporting the eight *Evaluation Functional Areas*.

***Develop a common and standard representation of the environment based on matured capabilities to support Simulation Based Acquisition.***

# SEIT SCHEDULE



# SEIT SCENARIO DETAILS

- Developed with OneSAF Testbed Baseline (OTB)
- FCS Infantry Fighting Vehicle Co (and BN HQs)
- Bde wrap-around (Janus)
- Attack and seize an enemy airfield and ammunition storage bunkers
- Enabled the interaction of CB & IR ISR with C4
  - Chemical attack and enemy vehicle sightings
  - NBC 1 and 4 reports and Spot reports

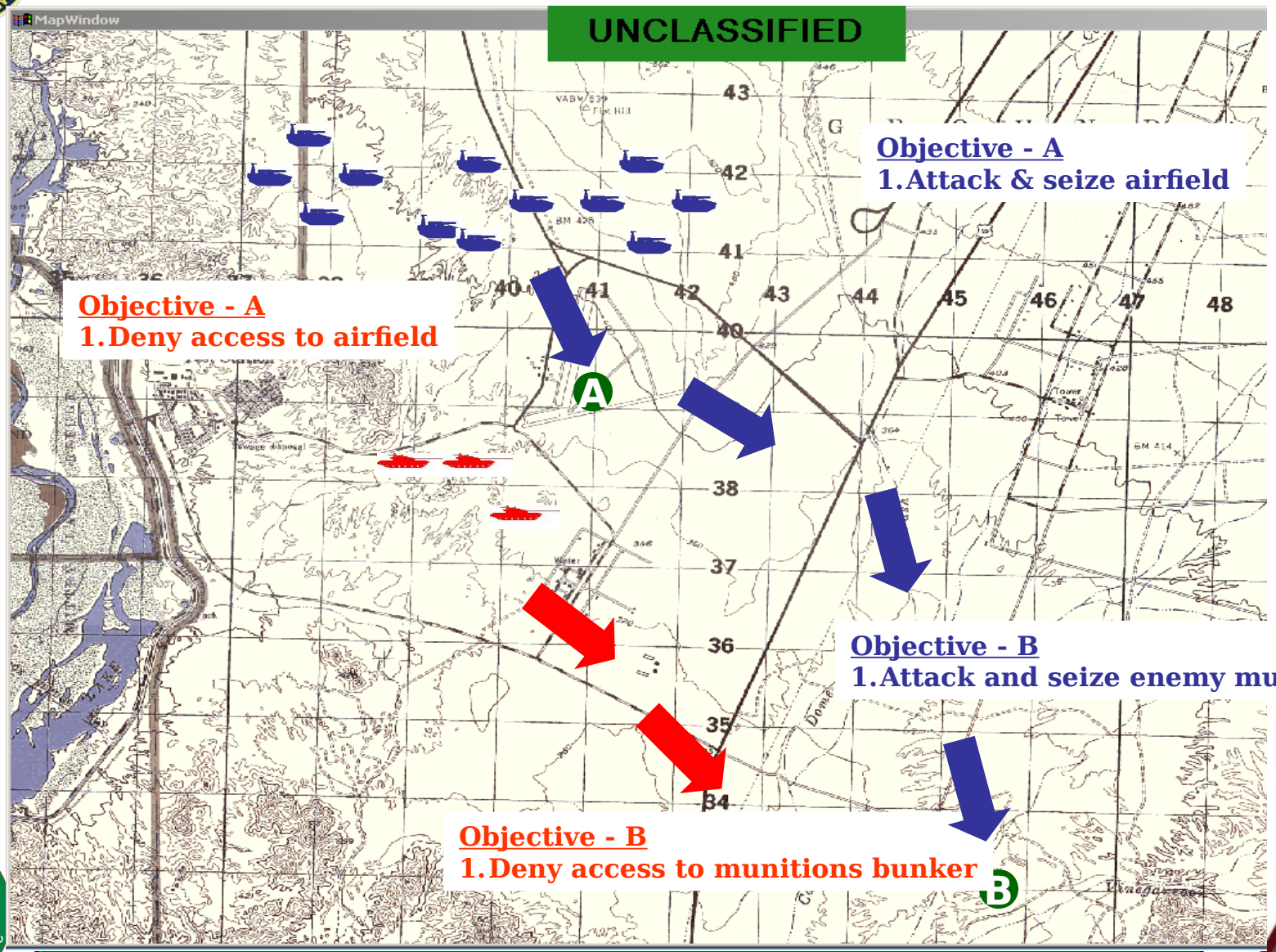
# SEIT THREADS SHARED

- Common red & blue force scenario
- Common correlated terrain – YPG
  - 20 x 20 K box on YPG
  - VPG center of excellence for digital terrain
  - Requisite weather stations, topography, man-made edifices and IR database
  - Possible actual location for FCS testing
- High resolution meteorology – DPG Met, NCAR
  - 4 Dimensional Weather Server (4DWx)
  - Four domains down to 1.1 kilometer resolution and atmospheric layers
  - Real time sensor input for updating predictions
  - Historical archives

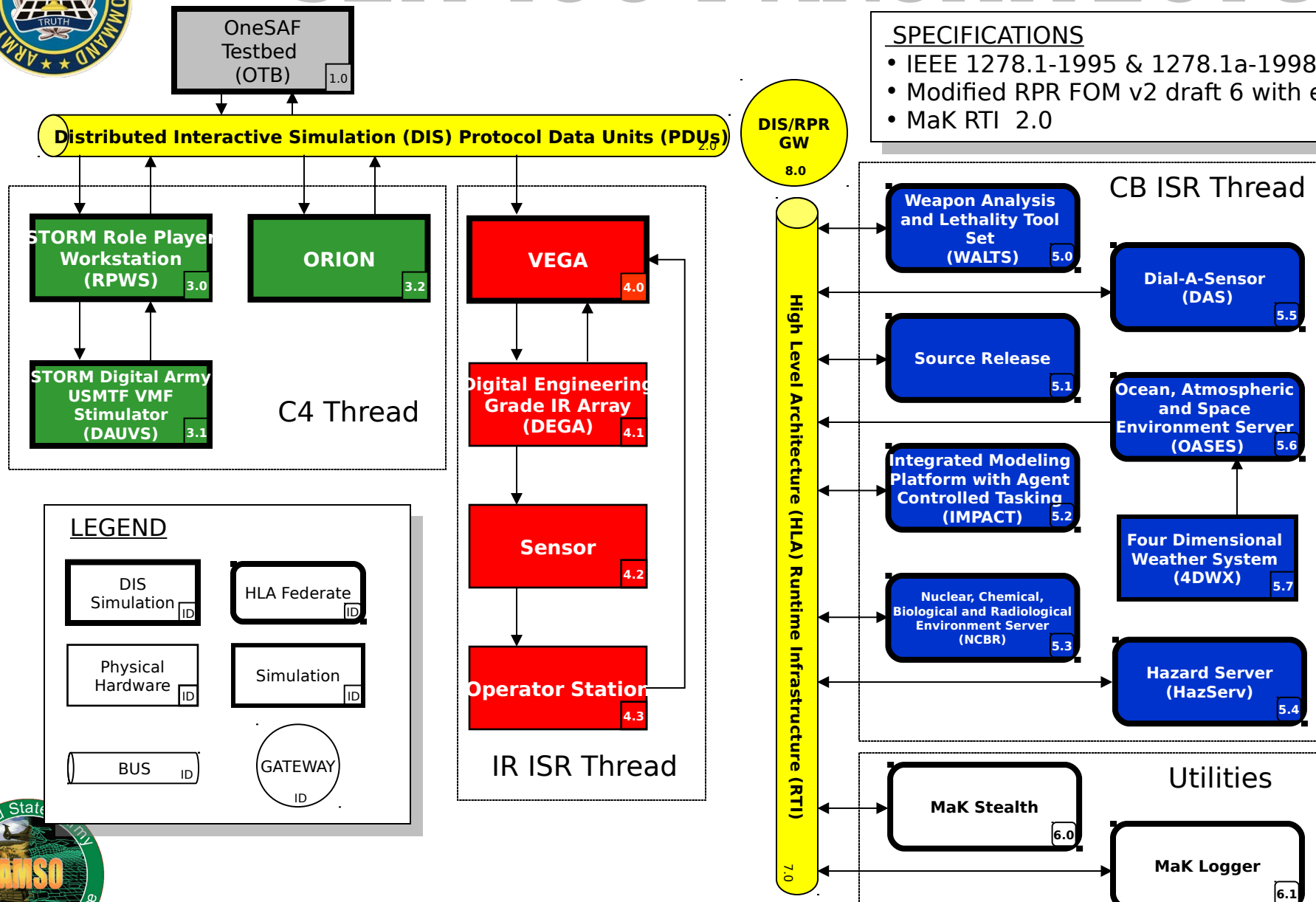
# SEIT LIVE ASSETS

- Platforms
  - NBC RV Stryker
  - Apache
  - Red Fixed Wing
- Stimulated live assets (Hardware-in-the-loop)
  - NBC RV Styker (potential)
    - Joint Service Lightweight Standoff Chemical Agent Detector (JSLSCAD)
    - Joint Biological Point Detection System (JBPDS)
    - M88 (Advanced Chemical Agent Detector Alarm) (ACADA)
  - RSTA Ground Platforms / Apache
    - IR Targeting Sensor

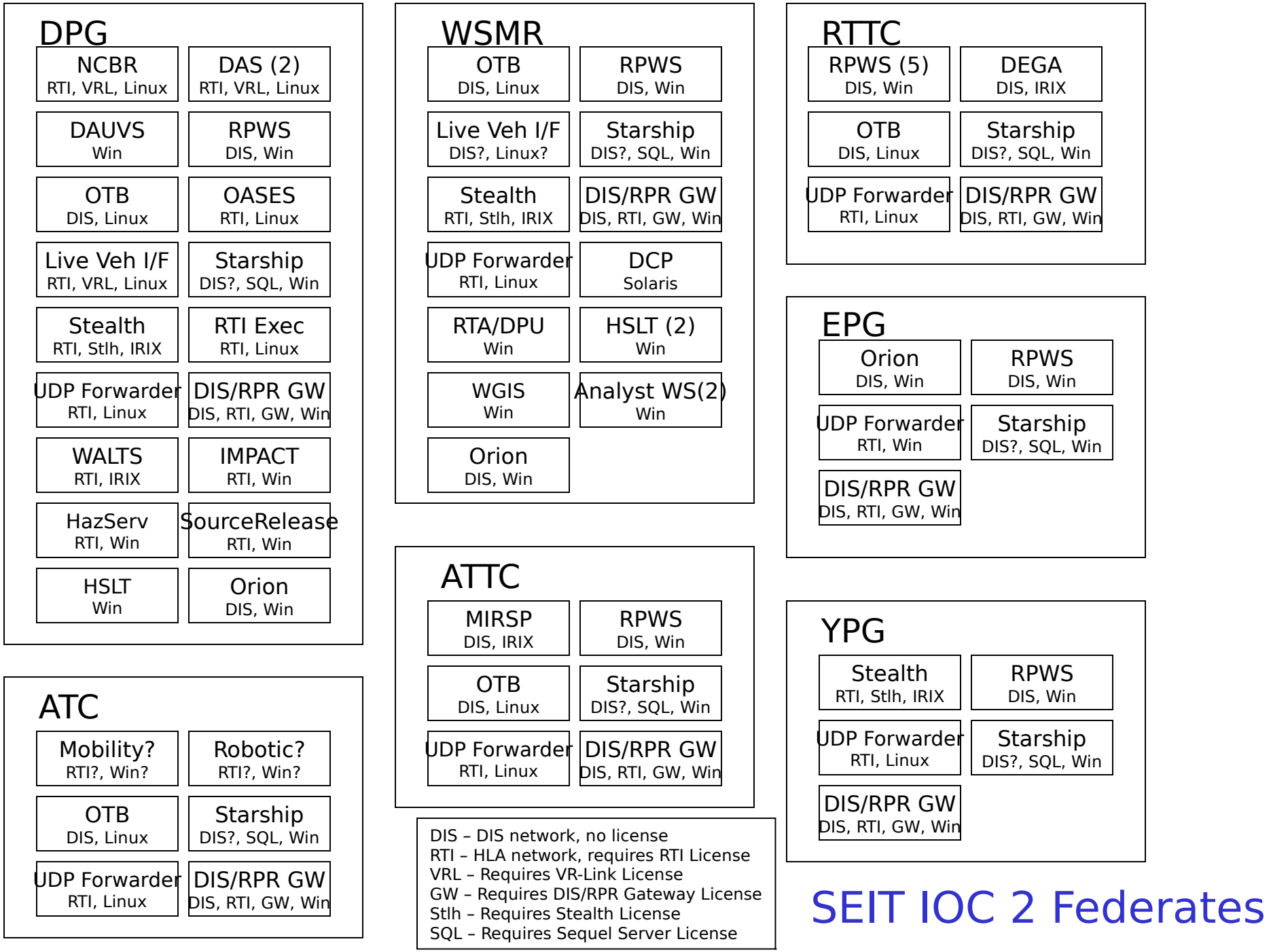
# SEIT SCENARIO



# SEIT IOC 1 ARCHITECTUR




SPECIFICATIONS
- IEEE 1278.1-1995 & 1278.1a-1998 DIS
- Modified RPR FOM v2 draft 6 with ext
- MaK RTI 2.0


DPG
NCBR
RTI, VRL, Linux
DAS (2)
RTI, VRL, Linux
DAUVS
Win
RPWS
DIS, Win
OTB
DIS, Linux
OASES
RTI, Linux
Live Veh I/F
RTI, VRL, Linux
Starship
DIS?, SQL, Win
Stealth
RTI, Stlh, IRIX
RTI Exec
RTI, Linux
UDP Forwarder
RTI, Linux
DIS/RPR GW
DIS, RTI, GW, Win
WALTS
RTI, IRIX
IMPACT
RTI, Win
HazServ
RTI, Win
SourceRelease
RTI, Win
HSLT
Win
Orion
DIS, Win
ATC
Mobility?
RTI?, Win?
Robotic?
RTI?, Win?
OTB
DIS, Linux
Starship
DIS?, SQL, Win
UDP Forwarder
RTI, Linux
DIS/RPR GW
DIS, RTI, GW, Win
WSMR
OTB
DIS, Linux
RPWS
DIS, Win
Live Veh I/F
DIS?, Linux?
Starship
DIS?, SQL, Win
Stealth
RTI, Stlh, IRIX
DIS/RPR GW
DIS, RTI, GW, Win
UDP Forwarder
RTI, Linux
DCP
Solaris
RTA/DPU
Win
HSLT (2)
Win
WGIS
Win
Analyst WS(2)
Win
Orion
DIS, Win
ATTC
MIRSP
DIS, IRIX
RPWS
DIS, Win
OTB
DIS, Linux
Starship
DIS?, SQL, Win
UDP Forwarder
RTI, Linux
DIS/RPR GW
DIS, RTI, GW, Win
DIS – DIS network, no license
RTI – HLA network, requires RTI License
VRL – Requires VR-Link License
GW – Requires DIS/RPR Gateway License
Stlh – Requires Stealth License
SQL – Requires Sequel Server License
RTTC
RPWS (5)
DIS, Win
DEGA
DIS, IRIX
OTB
DIS, Linux
Starship
DIS?, SQL, Win
UDP Forwarder
RTI, Linux
DIS/RPR GW
DIS, RTI, GW, Win
EPG
Orion
DIS, Win
RPWS
DIS, Win
UDP Forwarder
RTI, Win
Starship
DIS?, SQL, Win
DIS/RPR GW
DIS, RTI, GW, Win
YPG
Stealth
RTI, Stlh, IRIX
RPWS
DIS, Win
UDP Forwarder
RTI, Linux
Starship
DIS?, SQL, Win
DIS/RPR GW
DIS, RTI, GW, Win
SEIT IOC 2 Federates

# LAYERED ARCHITECTURE

**OPERATIONAL LAYER**

OneSAF Test Bed (OTB)

- Provides operational scenario
- Creates red/blue forces with functional capabiliti

**INTEGRATION LAYER**

| IR ISR Thread | C4 Thread | CB ISR Thread |
|---|---|---|
| Correlated and Synchronized Terrain | Correlated and Synchronized Terrain | Correlated and Synchronized Terrain |
| IR Sensor Acquisition of enemy targets | Report created | CB Sensor Detection of threat agents |
| Role player for any IR sensor platform | CB Threat Mapping | NBC Reports |
| SPOT Reports | RF Path Loss | |

**TEST LAYER**

| | | |
|---|---|---|
| • Simulated IR Environment<br>• Simulated IR Threats<br>• Physical Test Hardware<br>• Performance analysis<br>• Human-in-the-Loop | • STORM Suite<br>• ORION<br>• Simulate C3 messaging<br>• Capability to operate simulated or live | • Simulated CB Threats<br>• Dynamic Weather<br>• Capability to operate simulated through live |

**TEST ARTICLE**

| | | |
|---|---|---|
| • IR Sensor | • Radio Communication Net<br>• C4I Systems | • CB Sensor |

Vertical Integration

# SEIT IOC 2

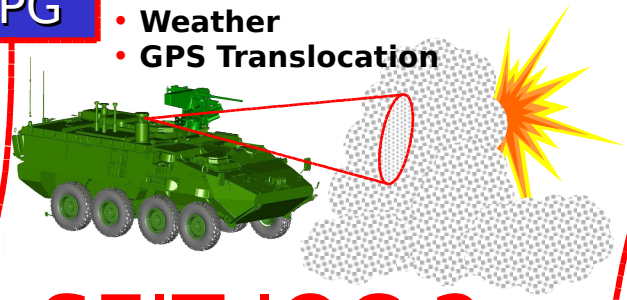
## Distributed Test & Evaluation

**EPG**

- Comm Networks
- Force Role Players
- Test Control
- Data Collection/Analysis

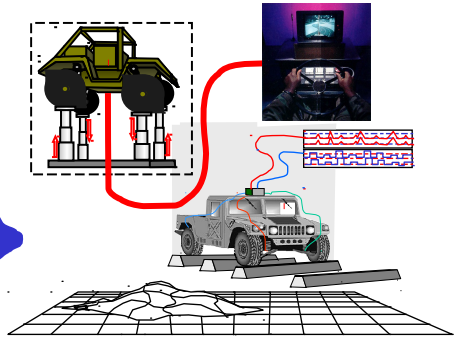
**DPG**

- Live Vehicle / Live Sensor
- Simulated Chemical Threat
- Weather
- GPS Translocation



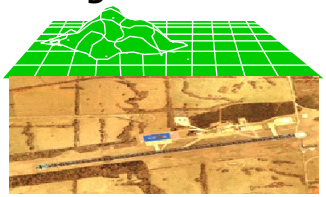
**ATC**

- Robotic Intelligence
- Mobility Modeling



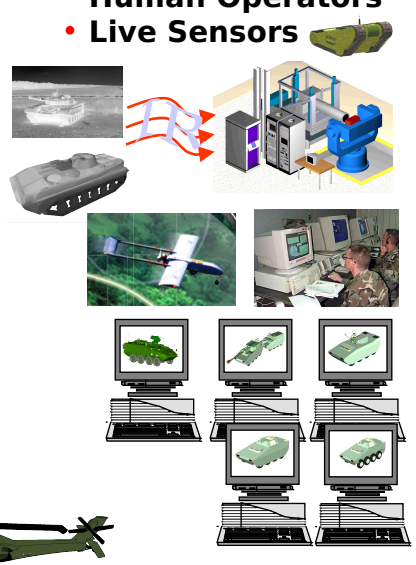
**YPG**

- Test Site
- Digital Terrain

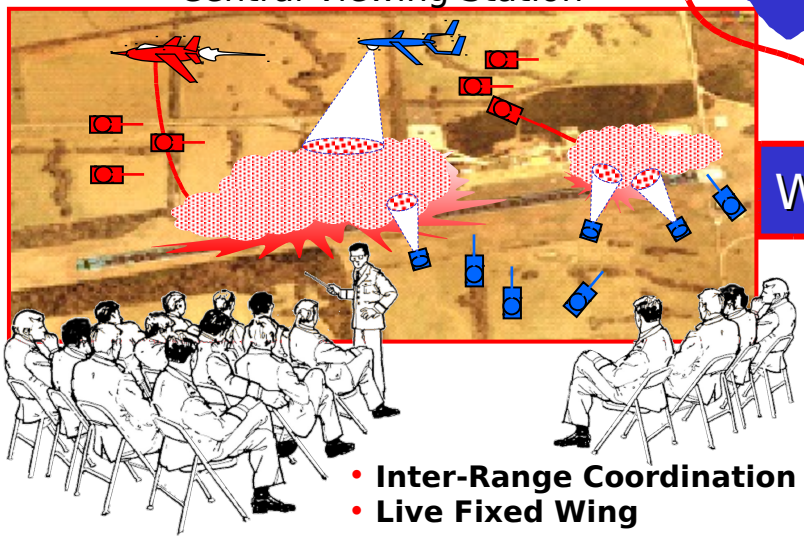


**RTTC**

- IR Sensor Vehicle Ro
- Human Operators
- Live Sensors



Central Viewing Station



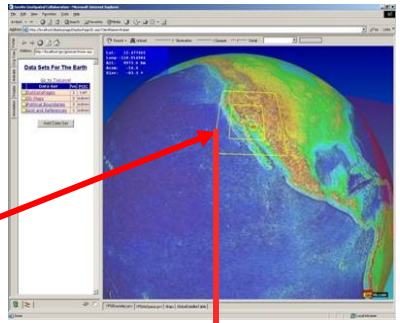
**WSMR**

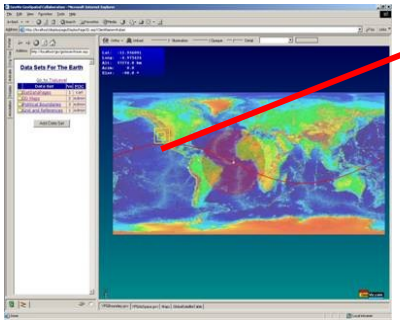
**ATTC**

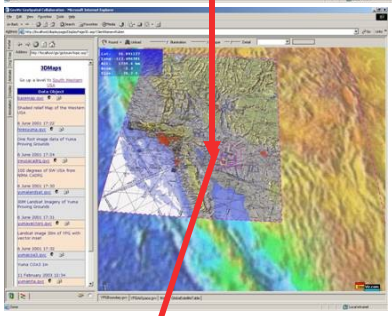
- IR Sensor Air Vehicle
- Human Operator
- Live Sensor

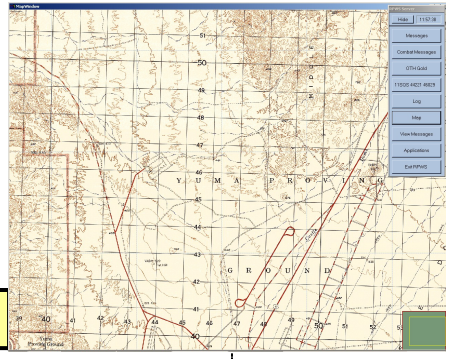
- Inter-Range Coordination Center (I
- Live Fixed Wing

# YPG SEIT ACTIVITIES



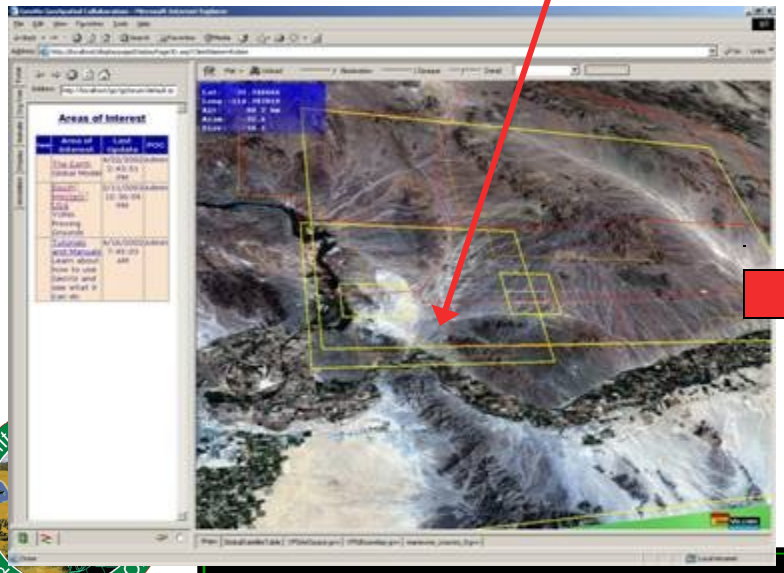


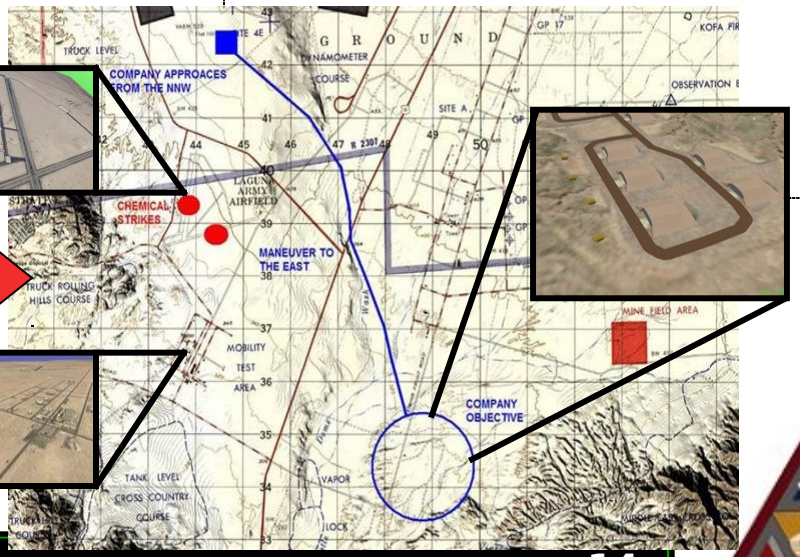




**Distributed Test Control Center**

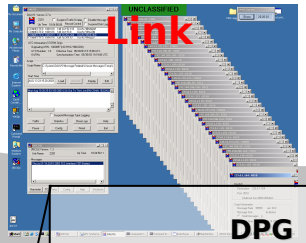
- Starship
- RPWS
- Orion
- MaK



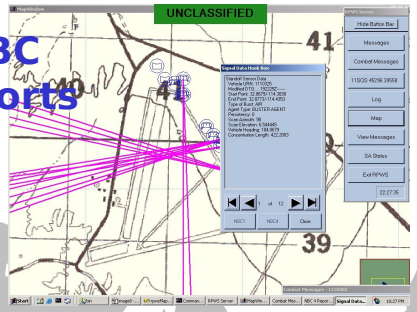



# EPG SEIT ACTIVITIES

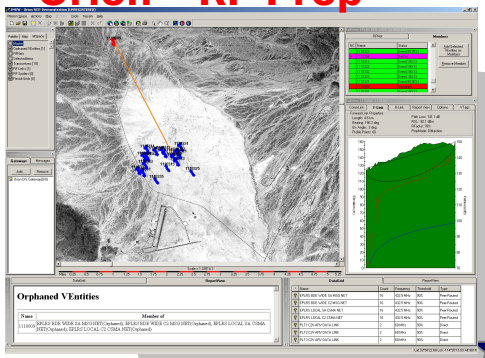
**DAUVS – Coms Link**



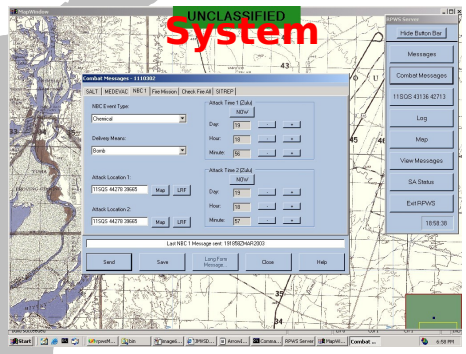
**NBC Reports**



**Orion – RF Prop**



**RPWS – C2 System**



**DPG**
STORM-RPWS: NBC Reports
STORM-DAUVS: Tactical Comm
Orion Feed
Starship

**ATC**
Orion Feed
Starship

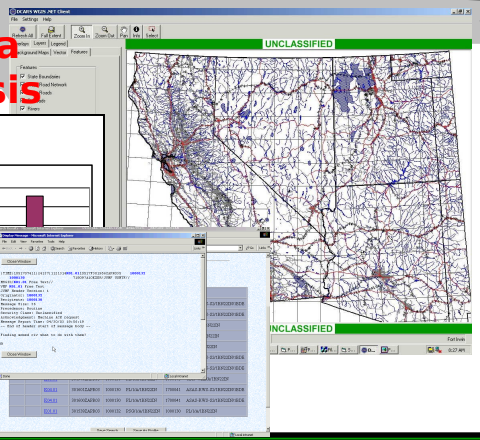
**EPG**
Orion Host
Starship

**WSMR**
Commander's View: STORM-RPWS
Analyst's View: DCARS
Test Control: Starship
Communication View: Orion Feed

**RTTC**
5x STORM-RPWS:
Ground Platform Spot Reports
Starship

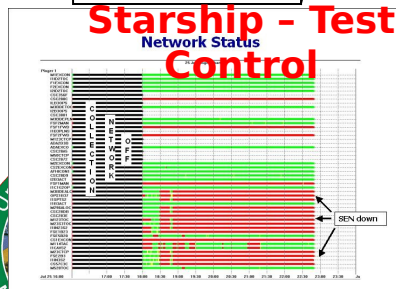
**YPG**
RPWS
Orion Feed
Starship

**DCARS – C2 Data Collection/Analysis**

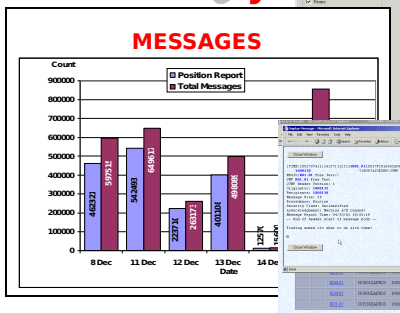


**ATTC**
STORM-RPWS:
Rotary Wing Spot Reports
Starship

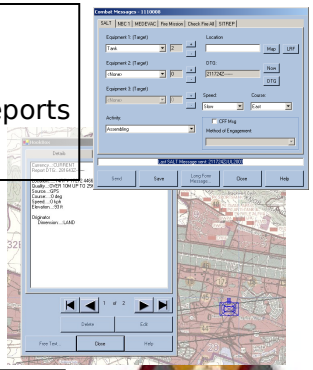
**Starship – Test Control**




**MESSAGES**

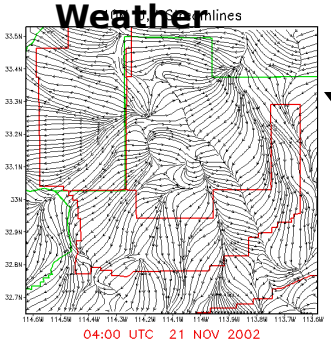



**Spot Reports**

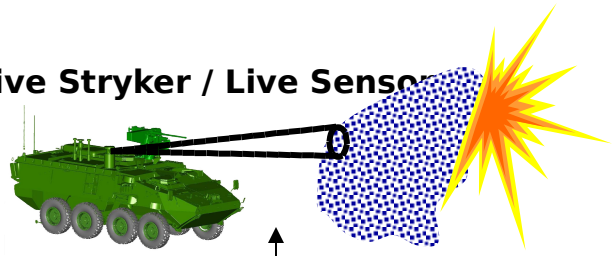


# DPG SEIT ACTIVITIES

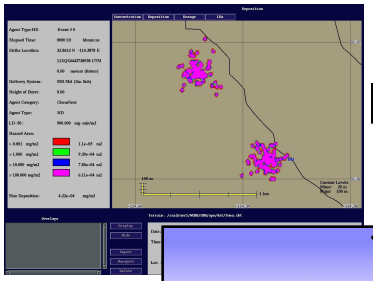
• 4DWX Weather

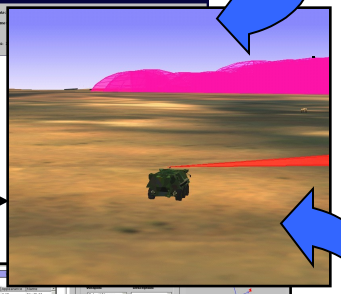



• Live Stryker / Live Sensor



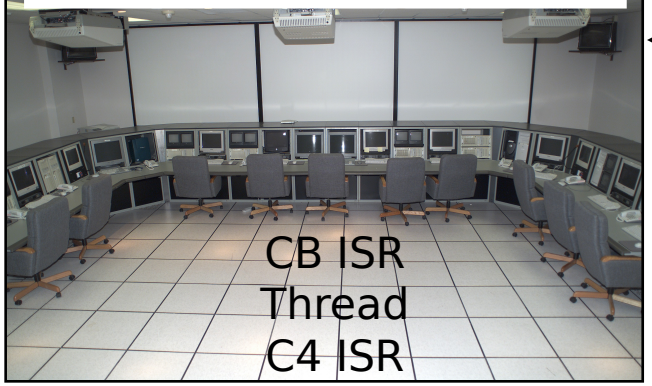
• NCBR



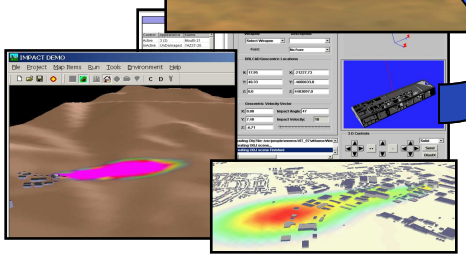


• Dial-a-Sensor

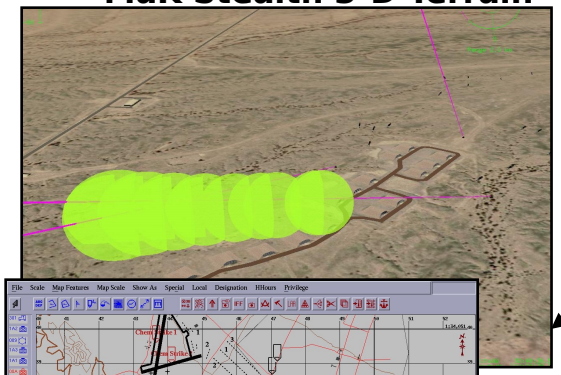
**Distributed Test Control Center**



CB ISR Thread
C4 ISR Thread
Mobility (ATC) Thread

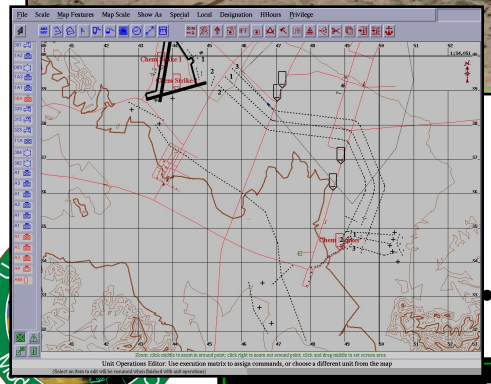


• MaK Stealth 3-D Terrain



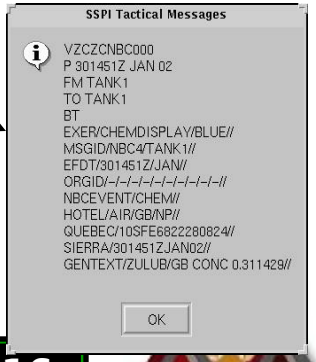
• DTRA WALTS/IMPACT

• Stryker Vehicle Dynamics Model

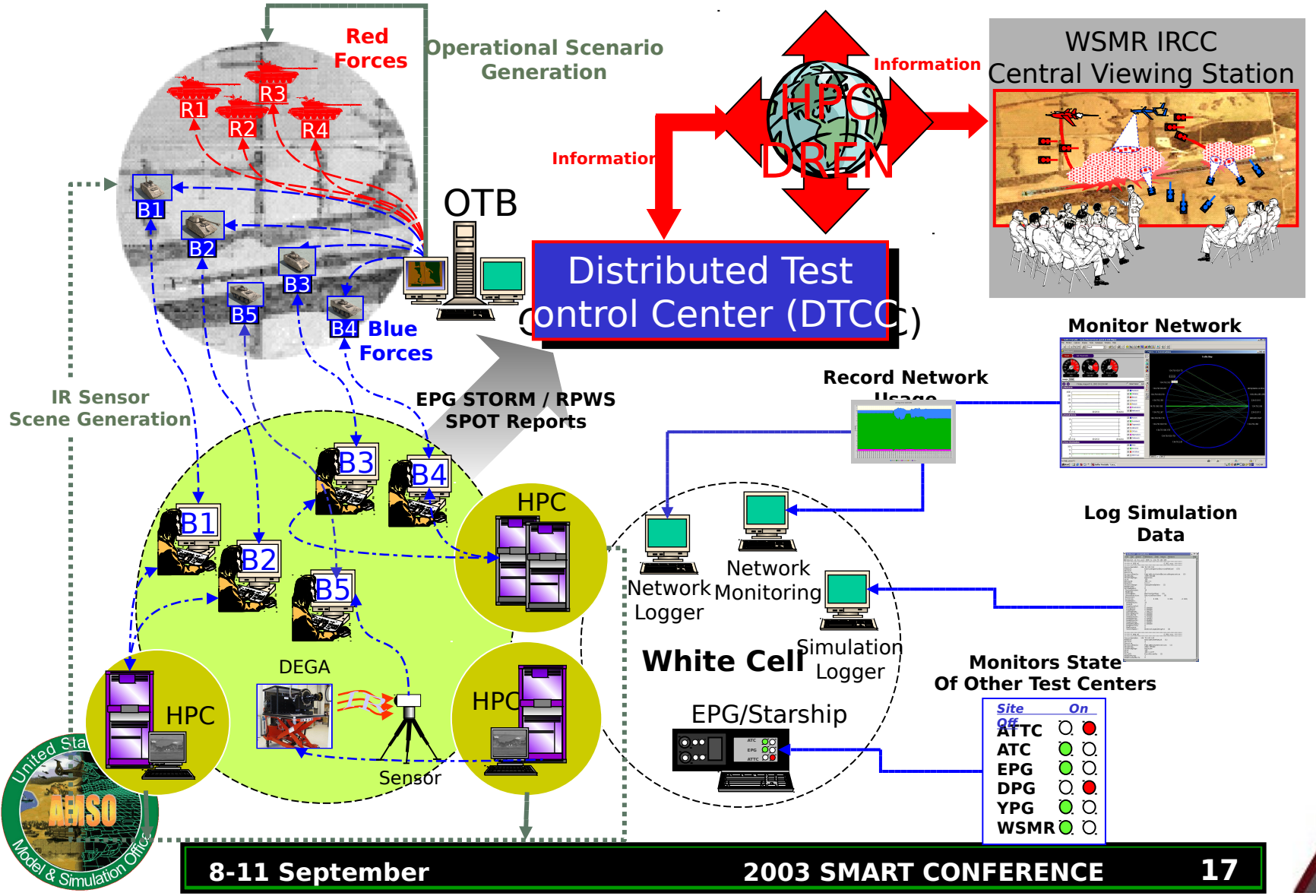


• OneSAF (RTTC)

• STORM Orion (EPG)

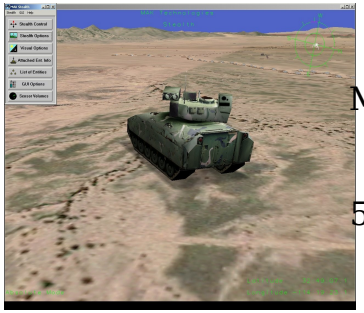


# RTTC SEIT ACTIVITIES



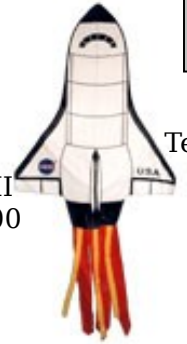
# ATC SEIT ACTIVITIES

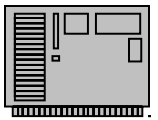
DREN



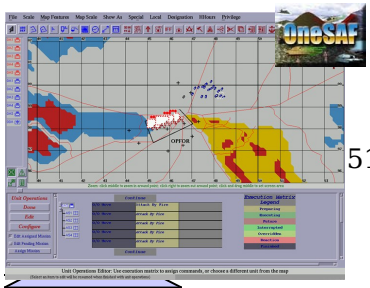
MAK Stealth Viewer
800 MHz,
512Mb RAM
Linux

Starship Client
Starship Server:
400 MHz PIII
Windows 2000





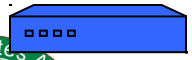
RICS
Test Instrument




OTB SAF
800 MHz
512 Mb RAM
Linux

ARL DIS Manager
(DIS Data Logger)
UDP Forwarder


MAK Data
Logger



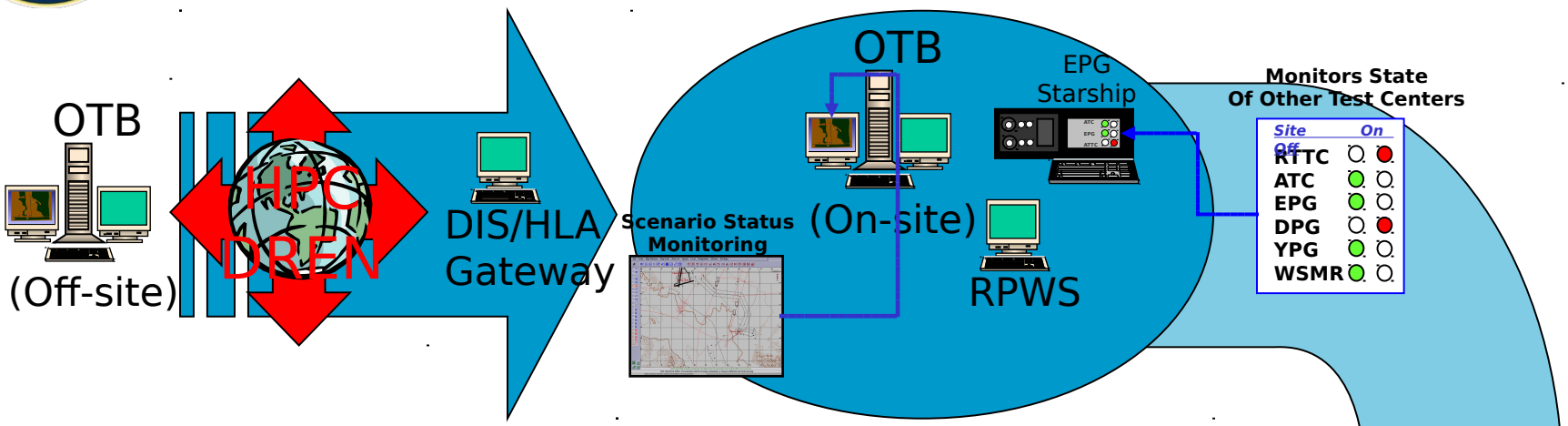
DLA/DIS
MAK Gateway
1 GHz, 512 Mb RAM

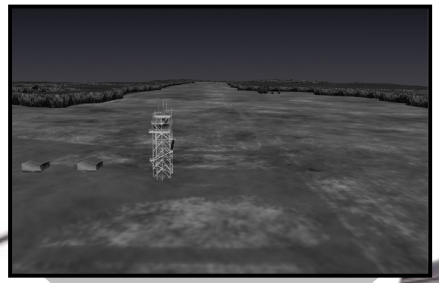
Stryker Vehicle Dynamics
Mobility Server
450 MHz, 256Mb RAM
Linux (Special Kernel)
VDMS
(Located at DPG)

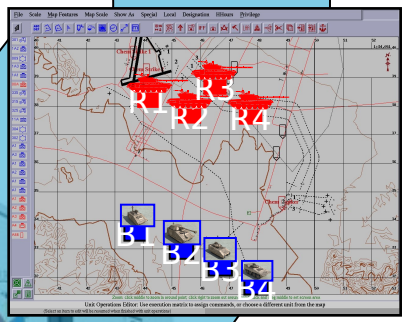
Video Teleconferencing
800 MHz 512 RAM
Windows 2000

Robotics Intelligence
SAF
800 MHz, 256MbRAM
Linux
(Located at DPG)

# ATTC SEIT ACTIVITIES



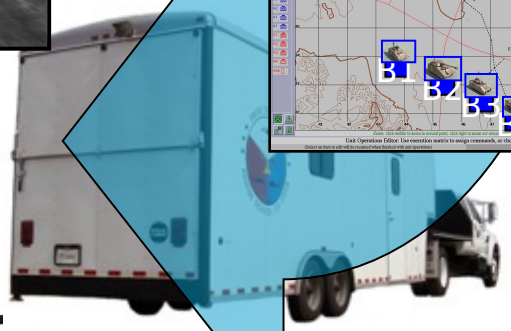







IR Energy

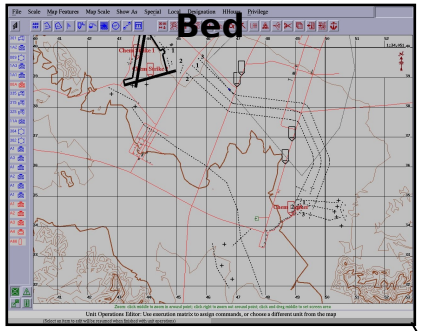




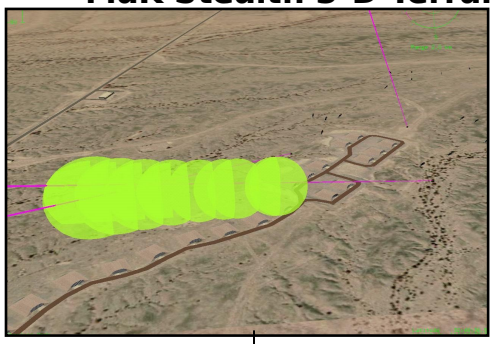
Live AH-64 / Live Sensor

# WSMR SEIT ACTIVITIES

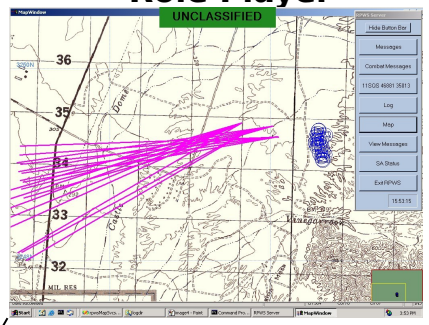
- **OneSAF Test Bed**



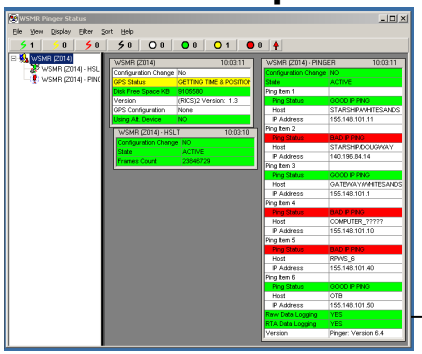
- **MaK Stealth 3-D Terrain**

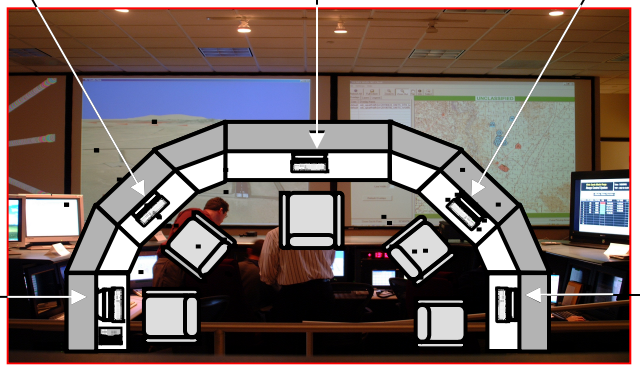


- **Role Player**

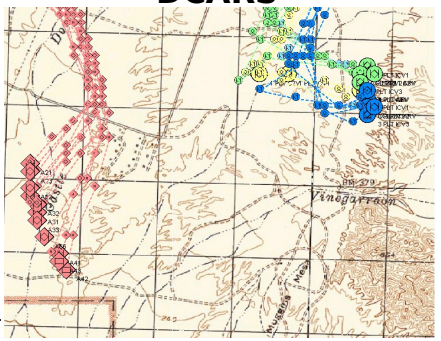



- **Starship**





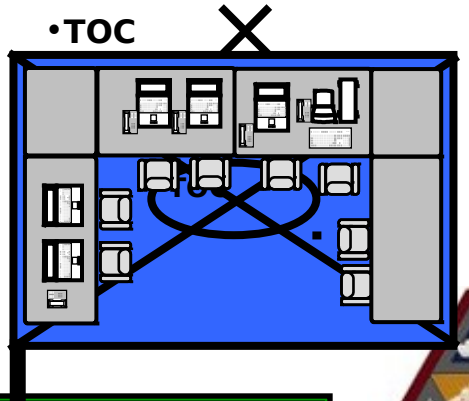
- **DCARS**



- **Live Aircraft – Simulated Red Chemical Strike**

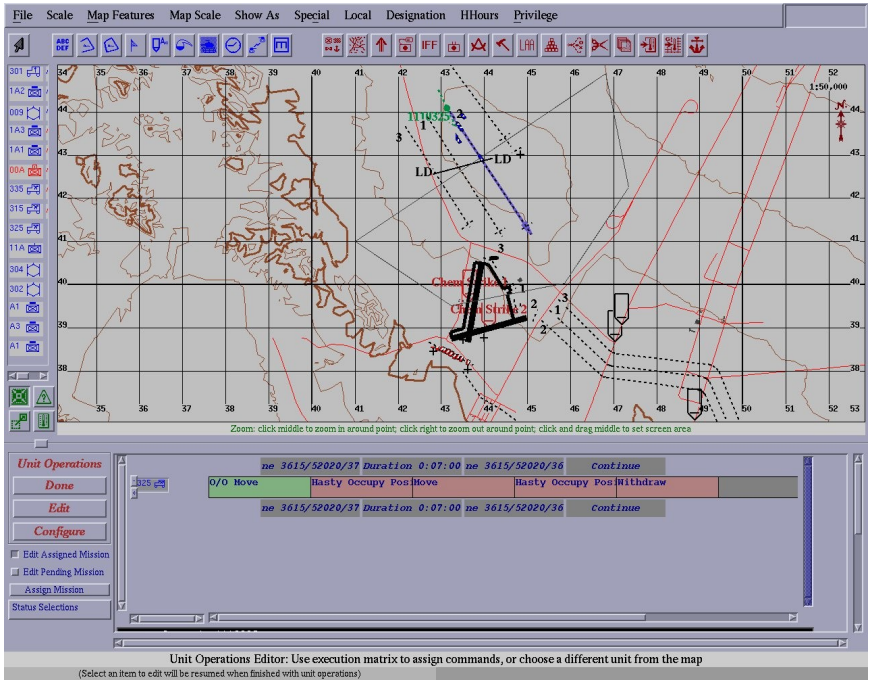
***Inter-Range Coordination Center***

- **TOC**



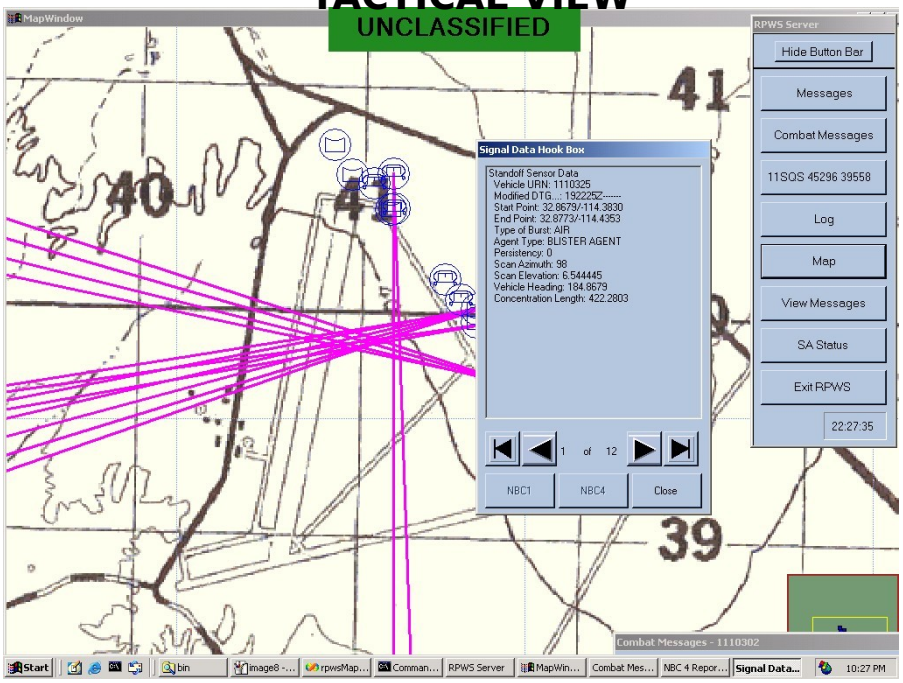
# C4 ANALYSIS

**One SAF Test Bed (OTB)**
**GAME TRUTH**




**Red / Blue Scenario**

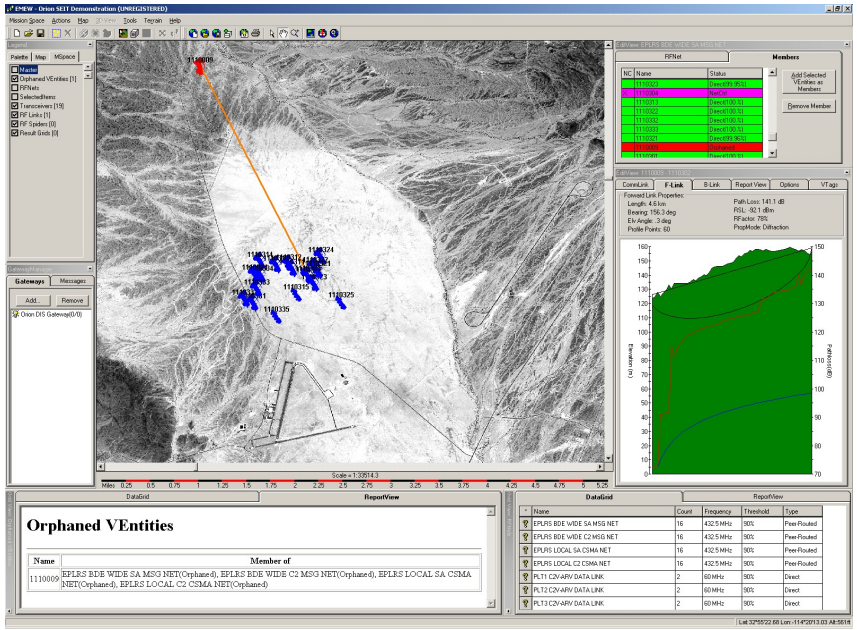
**Role Player Work Station**
**(RPWS)**
**TACTICAL VIEW**



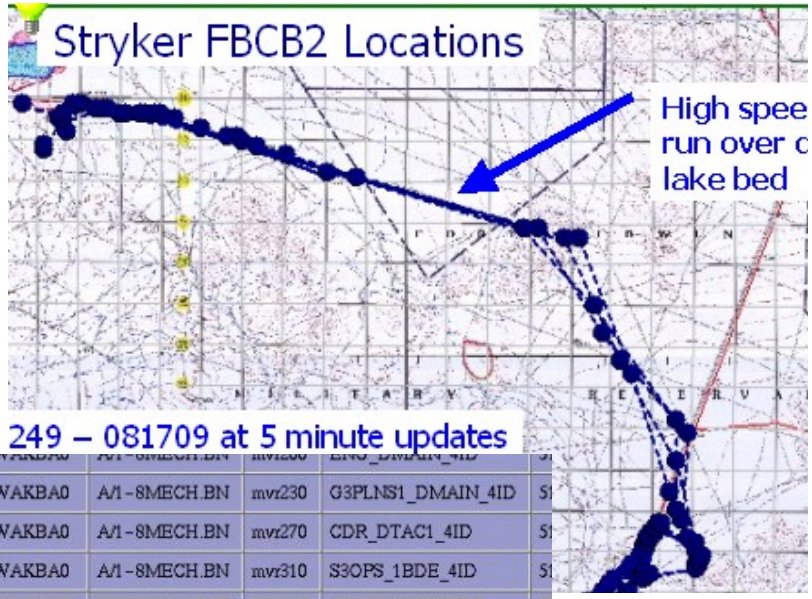

**FBCB2 Emulator**

# C4 ANALYSIS

## ORION



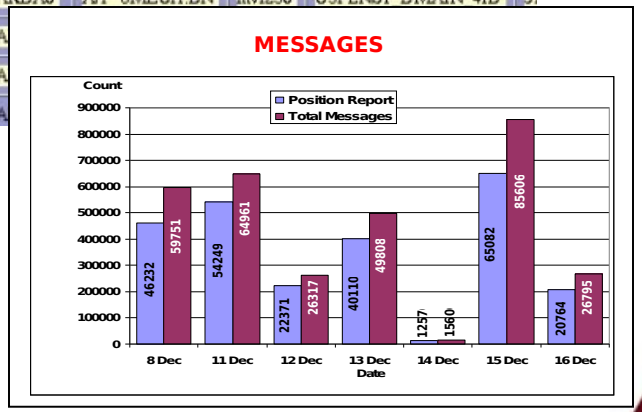

## Data Collection, Analysis And Review System (DCARS)




| | | | | | |
|---|---|---|---|---|---|
| 11-may-1999 03:59:00 | WAKBA0 | A/1-8MECH.BN | mvr230 | G3PLNS1_DMAIN_4ID | S1 |
| 11-may-1999 04:08:00 | WAKBA0 | A/1-8MECH.BN | mvr270 | CDR_DTAC1_4ID | S1 |
| 11-may-1999 04:08:00 | WAKBA0 | A/1-8MECH.BN | mvr310 | S3OPS_1BDE_4ID | S1 |
| 11-may-1999 04:24:00 | WAKBA0 | A/1-8MECH.BN | mvr200 | ENG_DMAIN_4ID | S1 |
| 11-may-1999 04:24:00 | WAKBA0 | A/1-8MECH.BN | mvr230 | G3PLNS1_DMAIN_4ID | S1 |
| 11-may-1999 04:24:00 | WA | | | | |
| 11-may-1999 04:24:00 | WA | | | | |
| 11-may-1999 04:29:00 | WA | | | | |

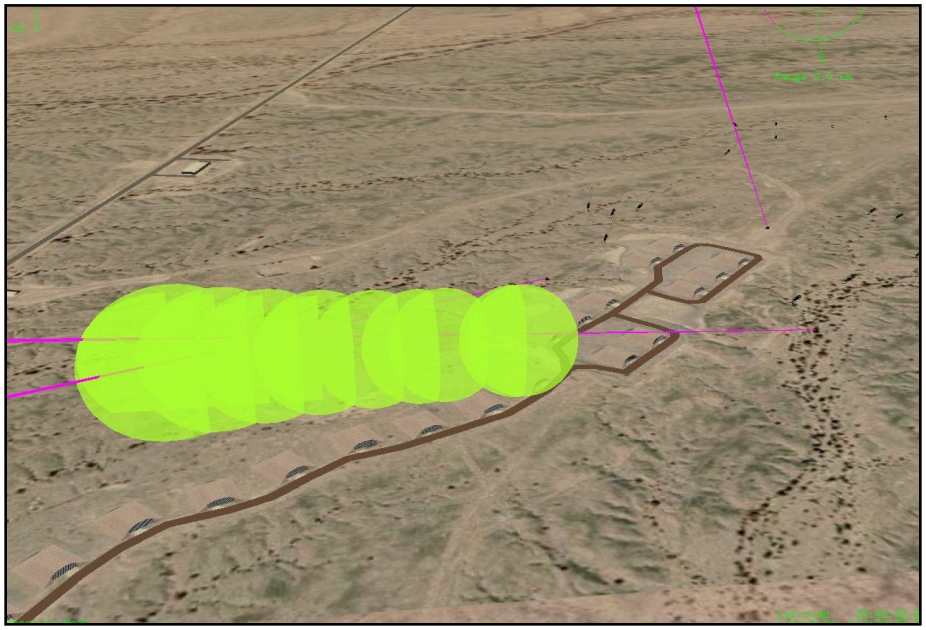
## C2 Nodes / RF Environment

## AAR & Evaluation Products

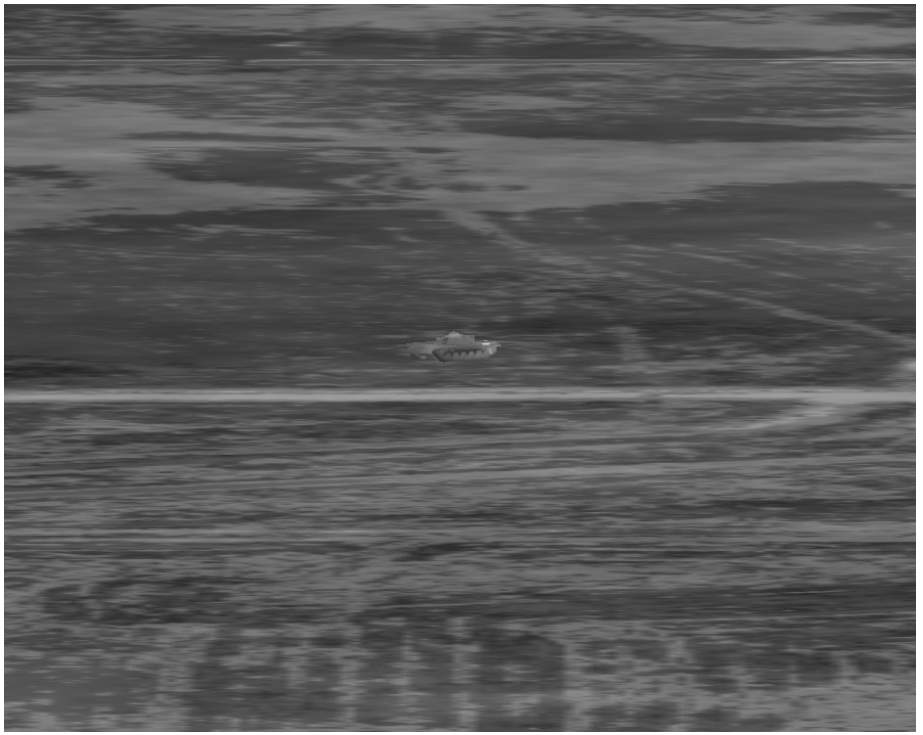


# SENSOR ANALYSIS

**MAK Stealth View**
**Nuclear, Chemical, Biological And Radiological**
**Dial-A-Sensor**



**Infra Red Scene Generator**



**Assess Chemical Detection Sensor Performance Assess IR Sensor (Targeting) Performance**

# SEIT BENEFITS - GEN

- Development driven by Army T&E / M&S requirements – support Army customers
- Supports cross acquisition domain M&S requirements
- Layered architecture results with autonomous elements that interact through common communication protocols
- More realistic representation of C4ISR in tactical scenarios

# SEIT BENEFITS – T&E

- Integrates existing live and simulated T&E capabilities resulting with enhanced synergy
- Augments physical testing providing increased & enhanced test parameters
- Distributed operations leverages local SMEs and fixed capital assets
- Near real-time data analysis and products
- Creating a subculture within DTC enhancing mission appreciation among test center personnel and an environment to support distributed testing

# SUMMARY

- SEIT is a fast tracked program leveraging existing capabilities resulting with a dynamic interoperating environment
- SEIT is focused on Army T&E needs and has application in multiple acquisition areas
- SEIT provides a more realistic representation of C4ISR systems in relevant tactical scenarios
- SEIT is a successful “use-case” of distributed testing